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Conference Abstract

A Spectacular Devonian Trilobite Specimen, *Dalmanites pratteni*, From Illinois Helps Shed Light on How Trilobite Eyes Worked

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Abstract

In 1912, the Field Museum purchased Henry Pratten's collection of fossils. One of the specimens was a dalmanitid trilobite with large eyes (Fig. 1) that Pratten collected from the Devil's Backbone. In 1933, this specimen was described as a new species of trilobite, *Dalmanites pratteni* (P 16704) (Roy 1933).

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Figure 1.

Dalmanites pratteni (FMNH P 16704), 1A Lateral , 1B Dorsal , 1C Anterior, and 1D oblique posterior. Photos by Mane Pritza.

Delo (1935) described a new genus of trilobite, *Dalmanitoides* and assigned it to a new family, Synphorinae. He noted *Dalmanites pratteni* has similar ornamentation to this genus. Delo (1940) later places *D. pratteni* in the genus *Odontochile*.

Other authors refer to it as *Dalmanites pratteni* (Clarkson and Levi-Setti 1975;Levi-Setti 1975; Frankie et al. 2008). Holloway and De Carvalho (2009) refer to it as '*Dalmanites*' *pratteni* and state that this species "probably belongs to the Synphoriinae".

The stratigraphic position of this specimen was not recorded. Seid et al. (2009) published a detailed geologic map of the Devil's Backbone. Most of the ridge is Middle Devonian Grand Tower and St. Laurent formations. However, the southern end of the ridge is faulted, and the Lower Devonian Backbone Limestone and Crystal Creek Chert (Emsian) is exposed. Frankie et al. (2008) and Devera et al. (2020) report *Dalmanites pratteni* occurring from the Crystal Creek Chert, indicating that the original specimen may have been collected here.

One of the most remarkable features of this fossil is the record number of lenses for a Phacopida. Roy (1933) reports 42 rows of eyes, however:

> "The exact number of lenses cannot be determined, as not all of them are preserved, nor are the areas which they occupied distinctly outlined. It is, however, certain that there are not less than 770 lenses on each eye." (Roy 1933).

I used images of the eyes and illustration software to estimate the number of lenses by filling in the geometric pattern they exhibit. I counted 730 lenses on the right eye and 712 lenses on left eye, which is missing a sizable piece (Fig. 2).

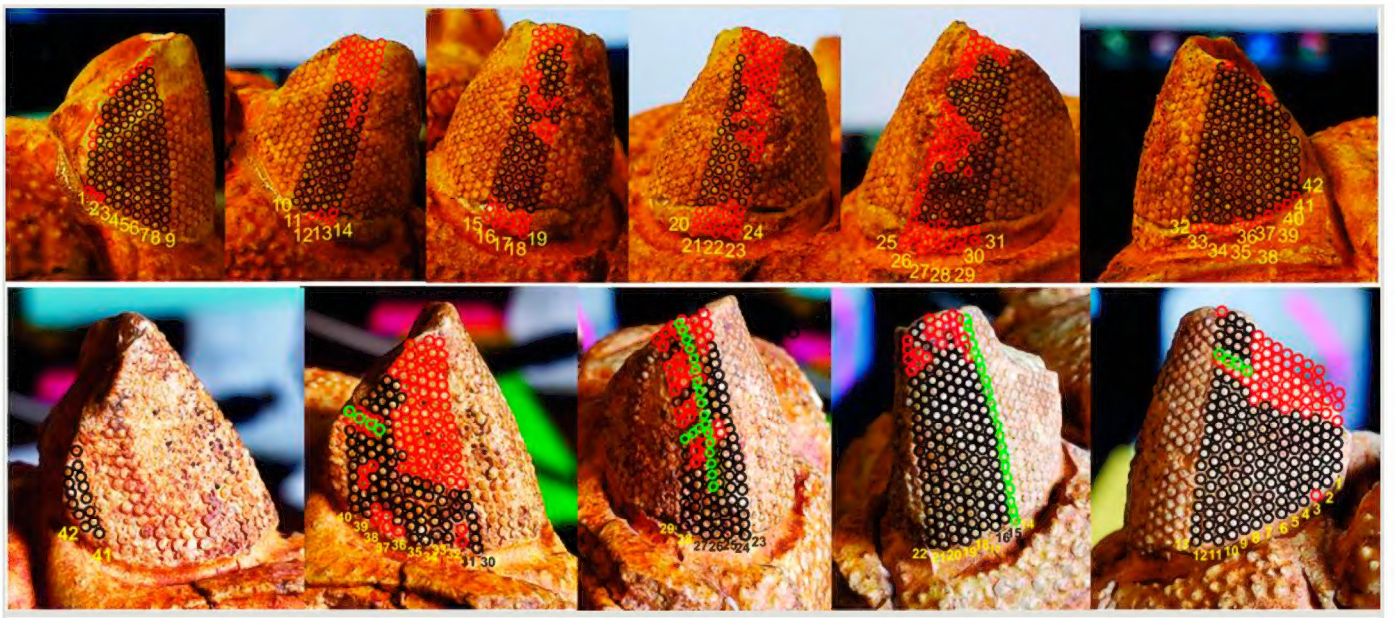

Figure 2.

Lenses on *Dalmanites pratteni* eye. Upper row is left eye, bottom row is right eye. Black circles indicate intact lenses, red circles estimate postion of lenses, green circles partially hidden or overlap row of lenses. Photo by P. Mayer.

The structure of some individual lenses in this specimen can be seen due to differential weathering. Clarkson and Levi-Setti (1975) reported the large round lenses were composed of a doublet structure that followed the principles established by Descartes (1637) and Huygens (1690) to eliminate spherical distortion. This doublet structure allowed the lens to gather more light and focus it on a single point, and strongly indicates that these trilobites had better vision then previously established (Clarkson and Levi-Setti 1975).

Keywords

trilobite vision, Field Museum, Henry Pratten, fossil, Devil's Backbone, Crystal Creek Chert

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Conflicts of interest

The authors have declared that no competing interests exist.

References

- Clarkson E, Levi-Setti R (1975) Trilobite eyes and the optics of Des Cartes and Huygens. Nature 254: 663-667. https://doi.org/10.1038/254663a0
- Delo DM (1935) A Revision of the Phacopid Trilobites. Journal of Paleontology v.9, 5: 402-420. URL: https://www.jstor.org/stable/pdf/1298148.pdf
- Delo DM (1940) Phacopid trilobites of North America. In: Geological Society of America (Ed.) Special Paper of the Geological Society of America. 29. https://doi.org/10.1130/SPE29
- Descartes R (1637) La geometrie. Originally published in 1637. Reproduced in Oeuvres de Descartes 6 URL: https://dn720202.ca.archive.org/0/items/geometryofrene00desc/geometryofrene00desc.pdf
- Devera JA, Nelson WJ, Hoffman CF (2020) Bedrock Geology of Union County, Illinois: Illinois State Geological Survey. USGS-STATEMAP contract report1-41. URL: https://resources.isgs.illinois.edu/maps/bedrock-geology-union-county-illinois
- Frankie W, Devera J, Seid M (2008) Guide to the geology of the Horseshoe Lake State Conservation area and surrounding area, Alexander County,. In: Illinois State Geological Survey (Ed.) Illinois Field trip guidebook 2008A. URL: https://library.isgs.illinois.edu/Pubs/pdfs/ftgb/ftgb2008A-horseshoelake.pdf
- Holloway DJ, De Carvalho M (2009) The extraordinary trilobite *Fenestraspis* (Dalmanitidae, Synphoriinae) from the Lower Devonian of Bolivia. Palaeontology 52 (4): 933-949. https://doi.org/10.1111/j.1475-4983.2009.00878.x
- Huygens C (1690) Traité De La Lumière. [Englsh translation by S. P. Thompson, 1912. Reprinted 1962, New York, Dover Pubilcations.]. Pieter van der Aa [In French]. URL: https://archive.org/details/huyghens-traite-de-la-lumiere-gauthier-villars-1690-english-trans
- Levi-Setti R (1975) Trilobites. A photographic atlas. University of Chicago Press, 213 pp. URL: https://archive.org/details/trilobitesphotog0000levi
- Roy SK (1933) A new Devonian trilobite from southern Illinois. Fieldiana:Geology 6: 67-82. URL: https://www.biodiversitylibrary.org/item/25136#page/5/mode/1up
- Seid MJ, Devera JA, Weedman AL, Amos DH (2009) Bedrock Geology of Altenburg Quadrangle, Jackson County, Illinois and Perry County, Missouri. Illinois State Geological Survey, USGS-STATEMAP contract report1-3. URL: https://resources.isgs.illinois.edu/maps/bedrock-geology-altenburg-quadrangle-jackson-county-illinois-and-perry-county-missouri